

# Hydraulic Fracturing Water Tracker

RBDMS

Water Tracker

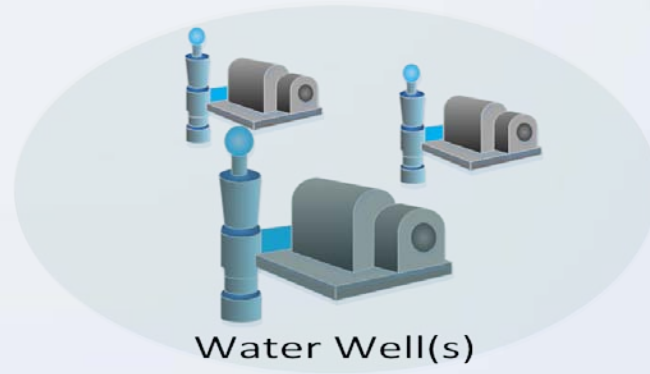




- New well water use
  - Mud systems for cooling, lubrication and pressure control
  - Completion practices use water as carrier fluid for pressure to fracture and move proppant.
- Old fields need water as driver to move oil through the reservoir

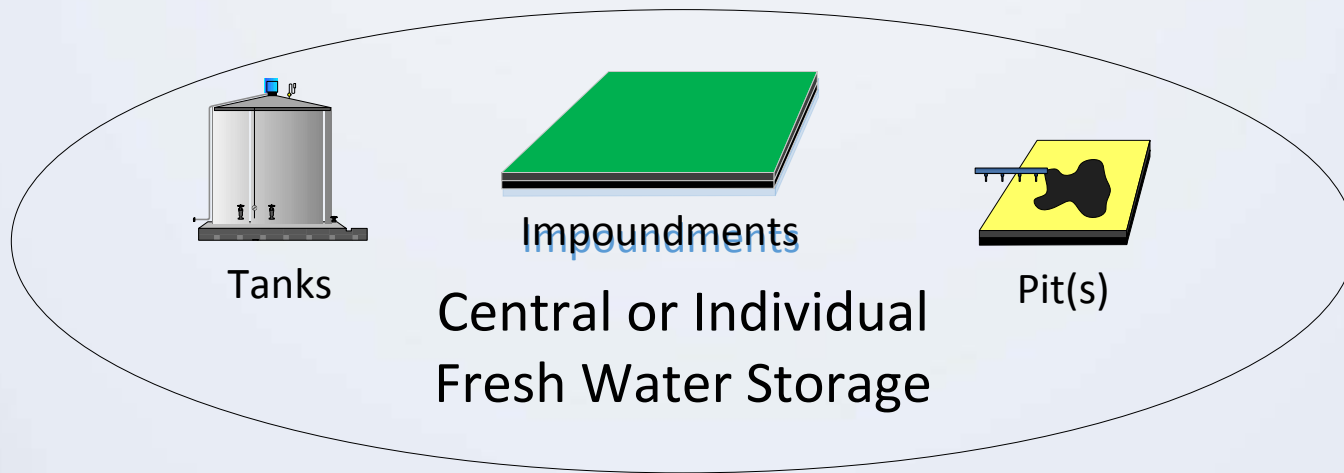


Streams & Reservoirs



Water Well(s)

- Access to fresh water is controlled
  - Individual owners
  - State law through regulatory agencies
- Water use is defined as consumptive use
  - Not returned to a water resource system
- Streams may require makeup water
  - Augmentation plan



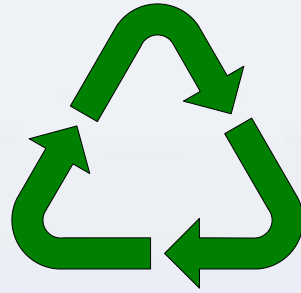
- Mobile storage tanks
- Reserve pit or impoundment on single well site
- Multi-well pit or impoundment on well site
- Centralized pit(s) or impoundment(s) servicing multiple locations

# Fluids Returned to Surface

- Considered exploration and production waste
- Regulated by the state
- Strict compliance and handling requirements
- Limited use depending on water quality
- Beneficial use may be regulated by different agency



- Reserve Pit or Impoundment on Single Well Site
- Multi-Well Pit or Impoundment on Location
- Centralized Pit or Impoundment Servicing Multiple Locations



- Fluids Reuse
  - Drilling Fluids
    - Other drilling operations
    - Soil supplement
  - Flowback
    - Sand
    - Depends on the stimulation technology
  - Produced Water
    - Beneficial Reuse
    - New Hydraulic Fracture Treatment Operation



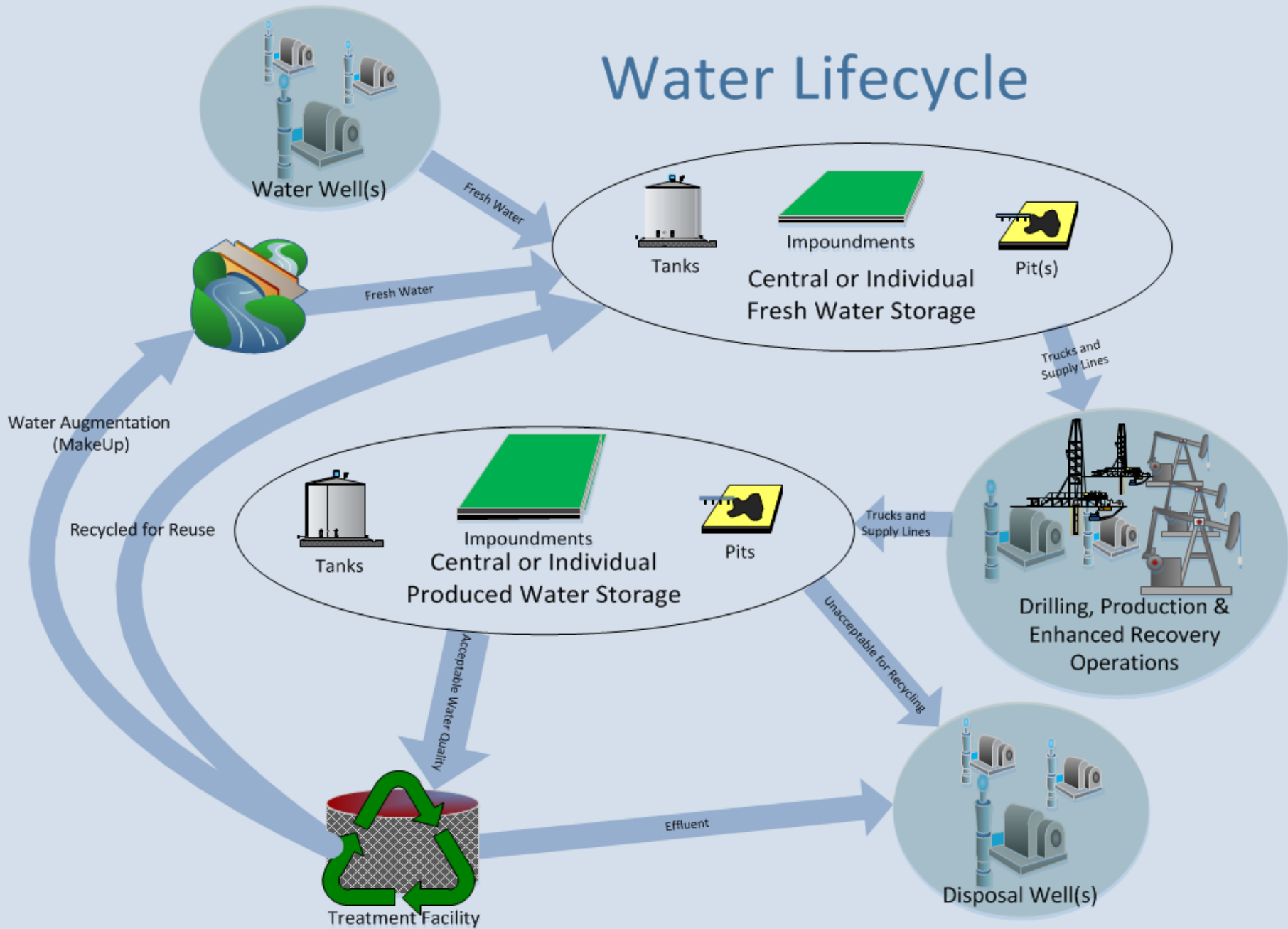
- Not all fluids can be recycled
- Proper effluent disposal from facility
- TDS exists throughout system and if totally eliminated creates negative impact on usability of output fluid – too clean
- Proper disposal of solid waste





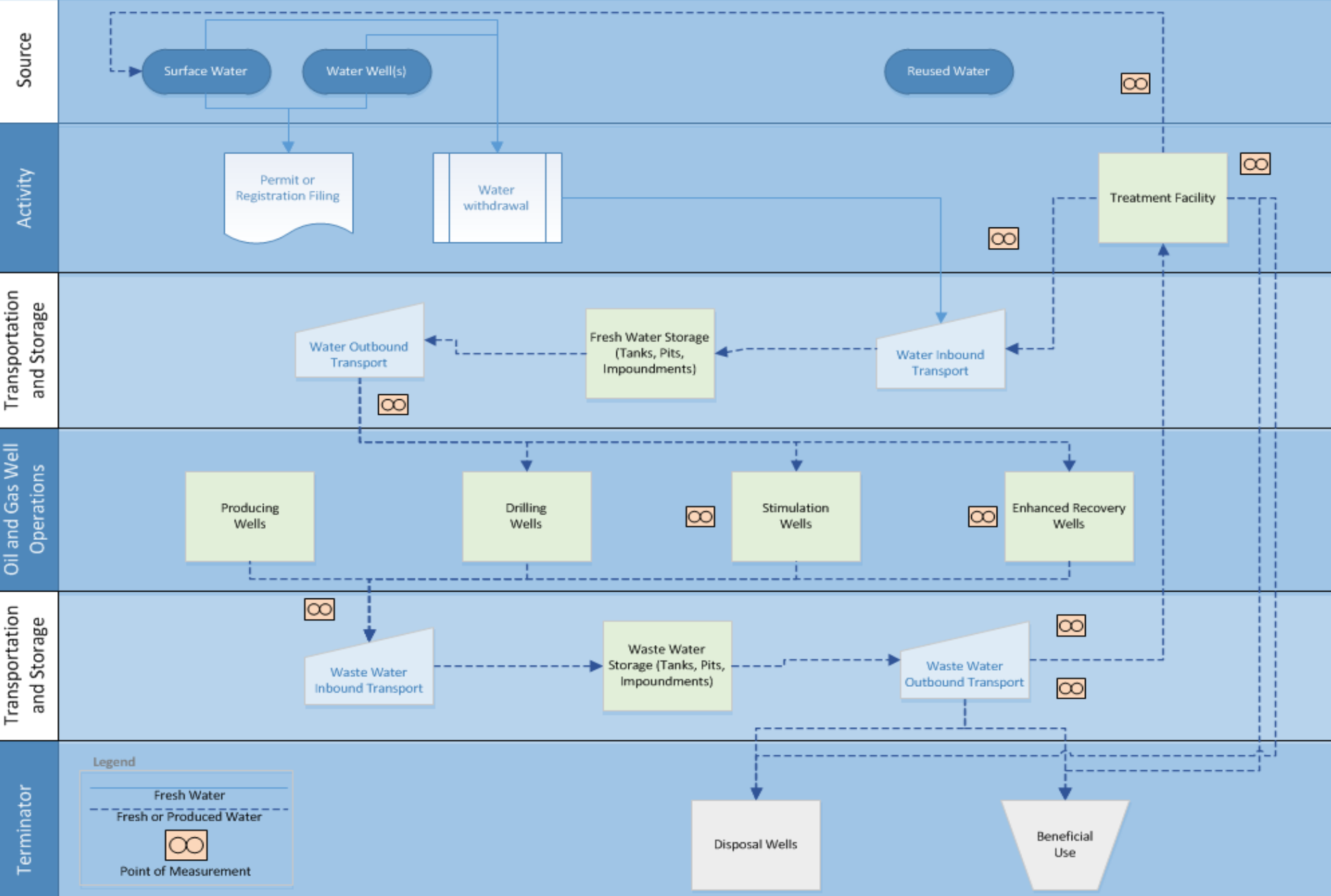
- Recycled - Reuse
  - Industry reuse
  - Public Water supply
  - Makeup Water – Augmentation

# Water Lifecycle



# Water Lifecycle Tracking

Water Movement



# Points of Measurement

- Transfer point is the inlet or outlet of storage or source, such as sales or regulatory control point.
- Critical volume measurement such as the hydraulic stimulation.
- Accuracy and methods of measurement are very disparate.

# Example Oil & Gas Regulatory Requirement

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Form  
5A  
Rev 6/12

**State of Colorado  
Oil and Gas Conservation Commission**



For COGCC Use Only

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 Phone: (303)894-2100 Fax:(303)894-2109

## COMPLETED INTERVAL REPORT

**Formation:** \_\_\_\_\_

**Status:** \_\_\_\_\_

Date of First Production for this formation: \_\_\_\_\_

This formation is commingled with another formation

Tubing Size: \_\_\_\_\_ Tubing Setting Depth: \_\_\_\_\_

Tbg Setting Date: \_\_\_\_\_ Packer Depth: \_\_\_\_\_

**Formation Treatment**

Treatment Type: \_\_\_\_\_

Perforations Top: \_\_\_\_\_ Bottom: \_\_\_\_\_

No. Holes: \_\_\_\_\_ Hole Size: \_\_\_\_\_

Open Hole:

Provide a brief summary of the formation treatment: Treatment Dates: Start: \_\_\_\_\_ End: \_\_\_\_\_

Total fluid used in treatment (bbl): \_\_\_\_\_

Max pressure during treatment (psi): \_\_\_\_\_

Total gas used in treatment (mcf): \_\_\_\_\_

Fluid density at initial fracture (lbs/gal) \_\_\_\_\_

Type of gas used in treatment: \_\_\_\_\_

Min frac gradient (psi/ft): \_\_\_\_\_

Total acid used in treatment (bbl): \_\_\_\_\_

Number of staged intervals: \_\_\_\_\_

Recycled water used in treatment (bbl): \_\_\_\_\_

Flowback volume recovered (bbl): \_\_\_\_\_

Fresh water used in treatment (bbl): \_\_\_\_\_

Disposition method for flowback: \_\_\_\_\_

Total proppant used (lbs): \_\_\_\_\_

Rule 805 green completion techniques were utilized:

Fracture stimulations must be reported on [FracFocus.org](http://FracFocus.org)

Reason why green completion not utilized: \_\_\_\_\_

# Conclusions

- Measurement of water use is complicated
- Recycling makes a difference but is complicated
- It makes sense to reuse and recycle oil and gas waste water
- Jurisdictional issues abound
- Things are changing



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